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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/882,911	06/15/2001	John A. Michejda	MICHEJDA 4-6	9771

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EXAMINER

FENTY, JESSE A

ART UNIT	PAPER NUMBER
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2815

DATE MAILED: 03/14/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/882,911

Applicant(s)

MICHEJDA ET AL.

Examiner

Jesse A. Fenty

Art Unit

2815

-- The MAILING DATE of this communication appears on the cover sheet with the corresponding address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 June 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 102

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claims 1, 2, 5, 7, 9, 10, 13, 15 and 17-20 are rejected under 35 U.S.C. 102(b) as being anticipated by Shibata (U.S. Patent No. 5,834,793).

In re claims 1, 9 and 17, Shibata (Fig. 10b) discloses a device and method of manufacturing a semiconductor device, comprising:

A channel region (306) located in a semiconductor substrate (301);

A trench located adjacent a side of the channel region;

An isolation structure (305) located in the trench; and

A source/drain region (302) located over the isolation structure; and

Dielectric layers (307) located over the semiconductor devices and having interconnects structures (308, 308') located therein that electrically connect the semiconductor devices to form an operative integrated circuit.

In re claims 2, 10 and 18, Shibata discloses the devices of claims 1, 9 and 17 respectively, wherein the trench is a first trench and the semiconductor device further includes a second trench located on an opposing side of the channel region, wherein the isolation structure is a first isolation structure (305) located in the first trench and the semiconductor device further includes a second isolation structure (305') located in the second trench, and wherein the source/drain region is a first source/drain region and the semiconductor device further includes a second source/drain region (302') located over the second isolation structure.

Art Unit: 2815

In re claims 5, 13 and 19, Shibata discloses the devices of claims 1, 9 and 17 respectively, wherein a side wall of the trench includes an oxide layer.

In re claims 7 and 15, Shibata discloses the devices of claims 1 and 9 respectively, wherein the isolation structure comprises an oxide.

In re claim 20, Shibata discloses the device of claim 17, wherein the semiconductor device forms an NMOS.

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

2. Claims 1, 3, 9 and 11 are rejected under 35 U.S.C. 102(e) as being anticipated by Liang et al. (U.S. Patent No. 6,346,729 B1).

In re claims 1 and 9, Ishii (Fig. 1) discloses a device and method of manufacturing a semiconductor device, comprising:

A channel region located in a semiconductor substrate (1);

A trench located adjacent a side of the channel region;

An isolation structure (9) located in the trench; and

A source/drain region (11, 12) located over the isolation structure.

In re claims 3 and 11, Ishii discloses the devices of claims 1 and 9 respectively, wherein the source/drain region (11) comprises polysilicon.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 4 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shibata as applied to claims 1 and 9 above, and further in view of Pan (U.S. Patent No. 6,344,669 B1).

5. In re claims 4 and 12, Shibata discloses the devices of claims 1 and 9 respectively, but does not expressly disclose the source/drain region comprising epitaxial silicon. Pan (Fig. 2I) discloses a CMOS device wherein the source/drain regions are comprised in epitaxial silicon. It would have been obvious to one skilled in the art at the time of the invention to form the source/drain regions of Shibata in an epitaxial region as disclosed by Pan for the purpose, for example, of improving the structure by forming the regions in an epitaxial layer, which has less defects than conventional silicon (Pan; column 4, lines 42-44).

6. Claims 6 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shibata (as above).

In re claims 6 and 14, Shibata discloses the devices of claims 1 and 9 respectively, wherein the isolation structure may comprise a nitrided layer (column 7, line 67), but Shibata does not expressly disclose the nitride layer formed on the oxide layer. However, nitride layers are a common layer used in the semiconductor art and it would have been obvious to one skilled in the art at the time of the invention to overlay the substrate and thus, the oxide layer with

Art Unit: 2815

nitride for the purpose, for example, of forming a barrier layer to enhance the isolation of various device regions.

7. Claims 8 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shitbaa as applied to claims 1 and 9 above, and further in view of Liang et al. (U.S. Patent No. 6,346,728 B1).

8. Claims 8 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liang et al. (as above).

In re claims 8 and 16, Liang disclose the devices of claims 1 and 9, wherein the source/drain region includes a source/drain contact region having a dopant concentration up to about $1E22$ atoms per cc and a lightly doped source/drain region (6a) having a dopant concentration of about $5E14$ atoms per cc, but does not expressly disclose a higher dopant concentration for the lightly doped drain region. It would have been obvious to one having ordinary skill in the art at the time the invention was made to optimize the device since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Ishii et al. (U.S. Patent No. 5,086,322) discloses a trench isolation structure and

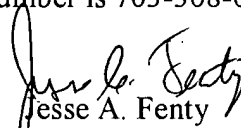
Art Unit: 2815

Tsuchiaki (U.S. Patent No. 6,271,566 B1) discloses an oxide isolation structure underneath source/drain regions in a trench.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jesse A. Fenty whose telephone number is 703-308-8137. The examiner can normally be reached on 5/4-9 1st Fri. Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on 703-308-1690. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-746-3892 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.


Jesse A. Fenty
Examiner
Art Unit 2815

JAF
March 11, 2002